Date: Sat, 26 Feb 94 04:00:49 PST
From: Info-Hams Mailing List and Newsgroup <info-hams@ucsd.edu>
Errors-To: Info-Hams-Errors@UCSD.Edu
Reply-To: Info-Hams@UCSD.Edu
Precedence: Bulk
Subject: Info-Hams Digest V94 #211
To: Info-Hams

Info-Hams Digest Sat, 26 Feb 94 Volume 94 : Issue 211

Today's Topics:

2nd CFV: sci.geo.satellite-nav
ARRL Repeater Directory
A transmission line loss question
Electric Fence RFI
Further criminalization of scanning
Medium range point-to-point digital links
MODS REQUEST: IC-2330
Money grabbing SOB's at STD.COM (was Re: ftp for files)

Send Replies or notes for publication to: <Info-Hams@UCSD.Edu>
Send subscription requests to: <Info-Hams-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Info-Hams Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/info-hams".

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: 25 Feb 1994 16:53:34 -0500
From: bounce-back@uunet.uu.net
Subject: 2nd CFV: sci.geo.satellite-nav
To: info-hams@ucsd.edu

LAST CALL FOR VOTES (of 2)
unmoderated group sci.geo.satellite-nav

Newsgroups line:
sci.geo.satellite-nav Satellite navigation systems, especially GPS.

Votes must be received by 23:59:59 UTC, 8 March 1994.

After this CFV appears on news.announce.newgroups, it will be posted
to the GPS Digest <gps-request@tws4.si.com>.

This vote is being conducted by a neutral third party. For voting questions only contact rdippold@qualcomm.com. For questions about the proposed group contact Andy Arkusinski <arkusinski_andy@si.com>.

CHARTER

This will be an unmoderated newsgroup.

SCI.GEO.SATELLITE-NAV was chosen because the focus of this group is on navigation. The SCI.SPACE hierarchy deals with various aspects of space exploration and use, but this newsgroup deals mostly with terrestrial applications. The fact that the space segment is in space is almost incidental to the focus of the newsgroup.

SCI.GEO.SATELLITE-NAV will allow a centralized location for discussion of global navigation satellite systems (GNSS). The charter specifically includes the US Global Positioning System (GPS) and Russian GLONASS, but is also open to discussion of other existing and future satellite positioning systems.

Some topics that fall under this newsgroup charter are:

* Technical aspects of GNSS operation.
* User experiences in the use of GNSS.
* Information regarding GNSS products.
* Discussion of GNSS policy (such as GPS selective availability).
* Extensions to basic GNSS technology, such as differential GPS and pseudolites.
* Navigational uses of satellite systems whose primary purpose is not navigation, such as a communication satellite net.

Examples of topics that would not fall under the group charter are:

* Other satellite systems such as communications and intelligence gathering, except for navigational uses of such systems.
* Discussion of space policy in general.
* Discussion of areas that may use GNSS, such as surveying, sailing, or aeronautics, except as they directly relate to use of GNSS.

GPS, in particular, has turned out to be a technology with a great deal of synergism with many fields. GPS is used, not only for military positioning which was the original purpose, but in applications as diverse as entomology and film making. A major intent of this newsgroup is to share the uses to which GNSS technology is

being put, thus inspiring even more innovative uses.

While part of the SCI.GEO hierarchy, this newsgroup does not exclude non-terrestrial uses of satellite navigation. Use of GPS to determine space vehicle position is within the charter.

This group is also intended to function as a resource for newcomers, who can post their questions and receive help from others who have passed that way before.

Rationale: There is no single newsgroup where information on GPS and other satellite navigation systems can be found. Questions are often posted in newsgroups such as sci.electronics, rec.aviation, and sci.aeronautics. To address this lack, the mailing list GPS Digest was started about a year ago, and now has over 400 subscribers.

Recently we attempted to convert GPS Digest from a moderated weekly newsletter to an unmoderated reflector. Submissions, which had been running at 2-3 per week, immediately picked up to 15 the first day. Our resources were overloaded, and the Digest is back to the original format. Many readers indicated the real-time response was helpful and suggested the formation of a newsgroup.

The RFD and CFV will be posted to the GPS Digest mailing list as well as Usenet newsgroups. Only those readers with access to Usenet should cast votes (for or against) formation of the newsgroup.

HOW TO VOTE

Send MAIL to: voting@qualcomm.com
Just Replying should work if you are not reading this on a mailing list.

Your mail message should contain one of the following statements:
I vote YES on sci.geo.satellite-nav
I vote NO on sci.geo.satellite-nav

You may also ABSTAIN in place of YES/NO - this will not affect the outcome. Anything else may be rejected by the automatic vote counting program. The votetaker will respond to your received ballots with a personal acknowledgement by mail - if you do not receive one within several days, try again. It's your responsibility to make sure your vote is registered correctly.

Only one vote per person and per account will be counted. Addresses and votes of all voters will be published in the final voting results list.

unmoderated group sci.geo.satellite-nav Bounce Ack List -No need to revote
---
berta@dsi.unimi.it
Dave.Begier@vault.tsd.itg.ti.com
PERNILLA@finabo.abo.fi
schmittec@MT2.LAAFB.AF.MIL
schmoelz@eapv38.tuwien.ac.at
wingo%7977.span@Fedex.Msfc.Nasa.Gov
wtm@l14ha-1.jsc.nasa.gov

Date: 25 Feb 1994 12:42 PST
From: mvb.saic.com!unogate!news.service.uci.edu!usc!howland.reston.ans.net!
sol.ctr.columbia.edu!newsxfer.itd.umich.edu!nntp.cs.ubc.ca!unixg.ubc.ca!
erich.triumf.ca!bennett@network.ucsd.edu
Subject: ARRL Repeater Directory
To: info-hams@ucsd.edu

In article <CLsn7y.BB1@hpcvsnz.cv.hp.com>, tomb@lsid.hp.com (Tom Bruhns) writes...
>Tom Randolph (randolph@est.enet.dec.com) wrote:
>
>: Ok, here's one... 147.345 repeater located in Webster, Mass. has been listed as
>: being in "Princeton" since day 1, sometime back in the 70s. The repeater
>: apparently was on Mt.Wachusett in Princeton for a short time on a test basis,
>: but has been located in Webster since then. No one has noticed this in the past
>: 15-20 years?
>
>Similarly, there's a Seattle-area repeater listed for Montlake Terrace which
>has been in Lynnwood for quite some time. I caught that one while practicing
>for a bunny hunt. It did make the practice more realistic ;-)

The ARRL repeater directory can only be as accurate as the information provided
by the various co-ordination groups. That in turn is only as accurate as the
information reported to the co-ordinators by the repeater owners.

I recently found out that a repeater listed at the Whistler ski resort has not
been active for 12 years or so, the alledged trustee knows nothing about it, and
the DOC shows the call as inactive. I guess the trustee didn't bother to tell
the co-ordinators when he took it down.

Peter Bennett VE7CEI | Vessels shall be deemed to be in sight
Internet: bennett@erich.triumf.ca | of one another only when one can be
Bitnet: bennett@triumfer | observed visually from the other
TRIUMF, Vancouver, B.C., Canada | ColRegs 3(k)

Date: Fri, 25 Feb 1994 18:51:25 GMT
From: mvb.saic.com!unogate!news.service.uci.edu!usc!howland.reston.ans.net!
vixen.cso.uiuc.edu!sdd.hp.com!hp-cv!hp-pcd!hpcvsnz!tomb@network.ucsd.edu
Subject: A transmission line loss question
To: info-hams@ucsd.edu

About a week ago, I posted:

: I have a perverse question about feeding an antenna with a coaxial
: transmission line. This is intended as food for thought. (You've
: been warned ;-)

: Assume you have a 50 ohm antenna you want to use on a single
: frequency in the two meter band. You will be feeding it with
: about 100 feet of coax, which will be cut to an exact integer
: multiple number of half-wavelengths on the operating frequency.
: Which of the following two transmission lines will you choose
: to give lower loss?

: A. 50 ohm air-insulated copper line with 1" OD

: B. 75 ohm air-insulated copper line with 1" OD -- in other
:   words, same line as in (A), but a smaller center conductor.

OK, I guess it's time for me to post my solution. First the
direct answer, then some explanation.

The 75 ohm line is actually slightly lower loss. This came as a
surprise to me when I worked through the calcs, which of course is
why I posted the question.

Some practical thoughts:

Though the line is said to be an integral number of half-waves,
the feedpoint impedance will not be exactly 50 ohms, because of
loss in the line; we should make sure the feedpoint SWR isn't
too high. Calcs below show this is probably OK.

Will environmental considerations make this idea impractical? Well,
three things I can think of are temperature, humidity and atmospheric
pressure. A change in any of these can cause a change in the
electrical length of the line and change the SWR seen by the source
as a result. My calcs (below) indicate none of these is a problem.
Ideally, you would control the humidity in the line, but temperature
and pressure probably wouldn't be controlled in a ham application.

Is there a better way? Yes, likely you can get lower loss if you

can tolerate the space you need to leave around an open-wire line.
A 200 ohm line with 1:4 baluns at each end could work quite well; it
would operate at a 1:1 SWR and could be quite low loss if built from,
say, 12 gauge or larger wire. 450 ohm line and 9:1 baluns could be
an even bigger win. I'll leave the calcs on this to others; they
should be straightforward since the SWR would be nominally 1:1.
However, coax is usually easier to install, and the 75 ohm stuff may
be available quite cheap from a cable TV company.

Calcs:

Assumed inner diameter of outer conductor: .875"
Zo=60ln(D/d) where D is outer diameter, d is inner diameter...
so for 50 ohm line, inner conductor is .3802"
For 75 ohm line, inner conductor is .2507"
dB atten for 100 feet of copper coax, perfect surface conditions,
is
    A100=.434*(1/d+1/D)*sqrt(f)/Zo
where
    d, D are inner and outer diameters in inches
    f is freq in MHz
    Zo is line impedance
Matched line loss at 146MHz for 100 feet of line is:

    50 ohm line: .396dB
    75 ohm line: .359dB

(These losses are about 0.1dB lower than the "book" values I
have; but the calcs assume perfect condutor surfaces and no loss
at all caused by dielectrics (supports).)

Date: 25 Feb 1994 20:35:58 GMT
From: iris.mbvlab.wpafb.af.mil!edfue0!engberg@uunet.uu.net
Subject: Electric Fence RFI
To: info-hams@ucsd.edu

In article <CLMqI7.Bvn@murdoch.acc.Virginia.EDU>, clh6w@faraday.clas.Virginia.EDU
(Carole L. Hamilton) writes:
|> I've got some bad interference on 80 through 10
|> meter bands from an electric fence about 500
|> feet away. The effect is very sharp clicks
|> about 3-4 per second. Analog noise blanker
|> works some but not 100%.
|>

|> Anyone have any cures?
|>
|> Tnx,
|> Ned Hamilton, AB6FI

Throw a small chain across the fence being certain it touches the ground.

--

Bob Engberg
phone: 907-552-7172
e-mail: engberg@ctis.af.mil
packet: K0MVL@KL7AA

Date: Fri, 25 Feb 1994 18:03:11 GMT
From: unogate!news.service.uci.edu!usc!elroy.jpl.nasa.gov!sdd.hp.com!
cs.utexas.edu!howland.reston.ans.net!europa.eng.gtefsd.com!library.ucla.edu!
csulb.edu!csus.edu!netcom.com!@mvb.saic.com
Subject: Further criminalization of scanning
To: info-hams@ucsd.edu

The FBI just announced their new wiretap bill for 1994.

Among its many provisions, monitoring cordless phone
will be criminalized, just like cellular is now.

Presumably the FCC will have to act to ban all scanners
that can tune the 46.xx range... I might suggest you buy those
continuous range scanners NOW before while they still are
permitted to US Citizens.

My third Pro2006 just arrived, as did my fourth ICOM W2A HT.

For more details of the Draft Bill and analysis by Attorney Mike
Godwin of the Electronic Frontier Foundation, check into
comp.org.eff.news and comp.org.eff.talk or send e-mail to
mech@eff.org.

The EFF will be fighting this bill as hard as it can; you
too can join the battle with us...

KN6JR

--
Grady Ward | compiler of Moby lexicons: | finger grady@netcom.com

+1 707 826 7715 | Words, Hyphenator, Part-of-Speech | for more information
(voice/24hr FAX) | Pronunciator, Thesaurus | 15 E2 AD D3 D1 C6 F3 FC
grady@netcom.com | and Language; all royalty-free | 58 AC F7 3D 4F 01 1E 2F

Date: Fri, 25 Feb 1994 15:13:08 GMT
From: mvb.saic.com!unogate!news.service.uci.edu!usc!elroy.jpl.nasa.gov!swrinde!emory!rsiatl!ke4zv!gary@network.ucsd.edu
Subject: Medium range point-to-point digital links
To: info-hams@ucsd.edu

In article <CLn0M7.7E1@srgenprp.sr.hp.com> glenne@sad.hp.com (Glenn Elmore) writes:
>Severe basenote drift acknowledged. (:>)

Note that I'm adding some material here that I'm sure Glenn knows, but may be interesting to other readers.

> The term "pathloss" can be misleading since in freespace signal isn't
>lost. Radio waves are divergant. The illuminated area increases as the
>square of the distance. Focus the power better and you get more in the
>receiving "bucket". With constant antenna aperture (physical size once
>you get beyond dipoles) this is more effectively done at shorter
>wavelengths/higher frequencies.
>
> Signals appear to drop because the aperture of the antenna "catching"
>it is getting smaller compared to the total illuminated area at 1/D^2.
>This is exactly why shorter paths and shorter wavelengths are better.

Free space loss is, as you noted, due to the geometry of the situation, and is not a dissipative loss. The following equations can be used.

Lfs = 32.45 + 20*log(d) + 20*log(f)

for d in kilometers and f in MHz. Or

Lfs = 37 + 20*log(d) + 20*log(f)

for d in miles and f still in MHz.

Both equations assume isotropic radiators. Antenna gains must be included in total path budget calculations.

There are other losses. Loss from atmospheric gases is figured by

Lo = Ko*d

where d is in kilometers and Ko varies with frequency. It's negligble
below 10 GHz, but peaks at nearly 20 db per km by 47 GHz. There are
charts of Ko versus frequency in most microwave handbooks. This is
a true dissipative loss, but is of little serious concern to most
amateurs.

There is also loss due to water vapor in the air. This is also of
importance mainly above 10 GHz, but has a peak in our 24 GHz band.
The equation is

Lw = H*Kw*d

Where H is abolute humidity in g/m^3, d is distance in km, and Kw is
from a table of attenuation values. At 24 GHz, Kw is .24 db/km. This
is a true dissipative loss. Rain and fog losses are similar to water
vapor losses, only much greater, and effective starting at lower
frequencies. At 10 GHz, loss in a 1 inch per hour rainstorm will be
1 db per km, at 24 GHz, the loss would be 3 db per km.

Lr = Kr*d

So for LOS paths, total propagation losses are

Lt = Lfs + Lo + Lw + Lr

>> I think that my point here is that LOS paths aren't practical for most
>> amateur data links. The ability to get LOS paths is very terrain specific,
>> and very $$$ specific. They either require fortuitous high sites, or
>> very expensive microwave towers.
>
>> Power is cheap. Sites are few and expensive. We have to be able to use
>> the sites *we can get* to build the network. Unlike a public utility,
>> we can't just go out and condemn ideal sites where we need them for
>> our microwave links. All of our path engineering has to revolve around
>> what we can do with the sites we can get.
>
>I agree that sites are of great value. I suppose a geostationary sites
>would be extremely valuable to amateurs but I don't agree that power is
>cheap nor really all that effective at making high information volume
>systems. Once one leaves quality paths, the cost of maintaining quality
>data flow is tremendous. Not only can't we generate enough power to
>overcome the additional losses and path variabilities cheaply but the
>excess power (that which doesn't get wasted in heating up the
>countryside) goes into removing the channel from reuse by other links
>(QRM). We need to be finding ways to use *less* power, not more, and
>not just because of the FCC mandate either.

Well lets look at the equations again. For troposcatter the loss equation is

Ls = 21 + 10*As + 10*log(f) + Lc

As is the scattering angle in degrees, f is frequency in MHz, and Lc is aperture to medium coupling loss in db. As can be calculated by

As = 0.005*d + (A1 + A2)

Where d is km and A1 and A2 are the elevation angles of the two antennas. As can be seen, the lowest elevation where a common volume of air is visible to the two stations gives the lowest loss.

Lc can be calculated by

Lc = 2 + 2*As/sqrt(a1 + a2)

Where As is as above, and a1 and a2 are the 3 db beamwidths of the two stations. That can be calculated as

a = sqrt(1/(10^G/10)

where G is the antenna gain in dbi. From these two it becomes obvious that scattering losses decline with wider beamwidths that encompass a larger common volume of air. Note the tradeoff, however, in that a wider beamwidth implies a lower antenna gain. This has to be balanced in the total link budget. Note also that scattering losses don't inrease as rapidly with increasing frequency as do free space losses. Scattering is particularly valuable where power is easy to generate and moderate gain antennas are used.

Another common technique for dealing with non-LOS paths is to make use of knife edge diffraction over an intervening obstacle. Knife edge losses can be calculated by

Lk = 20*log(h*sqrt(f/d1) - 38.8

where h is the elevation in meters relative to a free space path of the knife edge obstruction, f is frequency in MHz, and d1 is the distance from the near station to the obstacle. Note from inspection that lower frequencies work best here.

There are more effects. Fresnel zone losses are a concern with paths near the surface, and thermal inversions can royally screw microwave paths by bending the path away from the intended receiver. There's also near field absorption by trees, buildings, etc. This rapidly becomes

a major factor above 450 MHz, with losses climbing to 2 db per *meter*
of foliage at 10 GHz.

Put this all together and it spells mother******, at microwave. :-)
At 430 MHz, it all becomes much easier. Forward scatter and knife
edge diffraction are both common methods of extending range beyond
LOS at 430 MHz. It's much more costly at 10 GHz.

> I guess I'm changing my mind about what "build it and they will come"
> means in AR. I'm afraid it means:
>
> build it all, everything in place to provide highspeed user access worldwide,
> user access h/w, s/w and a host of free services and applications.
>
> offer it for "less than you can imagine" (certainly less than the XYL
> pain-threshold of $500 or so), available by charge card from all the
> mail order suppliers
>
> make it totatally turnkey, there must be no way for the user to mess it up
>
> and they will come. They will complain that it was done wrong, doesn't
> work well enough, is a ripoff and they could have done it better. *but*
> they will come and use it.

That about sums it up. :-(

Gary
--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

Date: Fri, 25 Feb 94 17:53:03 GMT
From: netcomsv!netcomsv!skyld!jangus@decwrl.dec.com
Subject: MODS REQUEST: IC-2330
To: info-hams@ucsd.edu

In article <2kl5lp$egl@news.udel.edu> walt@diusys.cms.udel.edu writes:

> Dont bother telling me to look at ftp.std.com... Those money-grabbing
> sons-a-bitches want to charge people for accessing their anonymous
> ftp account! I'll gladly look in another site that doesn't have a
> bunch of low-life .com folks running it though.
> --
> _____

> Walt Dabell KD3GS (302)645-4225 walt@diusys.cms.udel.edu
> Computer Specialist - U. of Delaware, College of Marine Studies
> 700 Pilottown Rd., Lewes, DE 19958

Here you have it folks. the Usenet "Clueless Asshole of the Week" winner.

What happened Walt, sit down on the old nutsack this morning?

Amateur: WA6FWI@WA6FWI.#SOCA.CA.USA.NA | "You have a flair for adding
Internet: jangus@skyld.grendel.com | a fanciful dimension to any
US Mail: PO Box 4425 Carson, CA 90749 | story."
Phone: 1 (310) 324-6080 | Peking Noodle Co.

Date: 25 Feb 1994 19:24:13 GMT
From: mvb.saic.com!unogate!news.service.uci.edu!usc!howland.reston.ans.net!noc.near.net!sunfish.hi.com!brainiac.hi.com!user@network.ucsd.edu
Subject: Money grabbing SOB's at STD.COM (was Re: ftp for files)
To: info-hams@ucsd.edu

In article <2kl5bf$egl@news.udel.edu>, walt@diusys.cms.udel.edu (Walt Dabell) wrote:
> I think it's a goddamn shame those cheap sons-a-bitches at std.com now
> want to charge us internetters for accessing their system! Anybody got
> any info on a system where there aren't a bunch of money-grabbing .com
> types running it?
> --
anonymous ftp still works; it appears that the ftp site on world has changed from world.std.com to ftp.std.com.

```
Connected to world.std.com.
220 world FTP server (Version 6.19 Wed Nov 24 18:28:15 EST 1993) ready.
Name (world.std.com:steve): anonymous
530-
530-    Sorry, there are currently too many FTP sessions connected to
530-"world.std.com".
530-
530-    The FTP archive is being moved to "ftp.std.com".  Unlimited
530-connections are allowed there, so please use it instead.
530-
530 User anonymous access denied.
Login failed.
ftp> close
221 Goodbye.
ftp> open ftp.std.com
```

```
Connected to ftp.std.com.
220 ftp FTP server (Version wu-2.1c(1) Sun Feb 13 14:46:20 EST 1994) ready.
Name (ftp.std.com:steve): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password:
230-
230-Hello!
230-
230-This is the anonymous FTP area for world.std.com, a public access Unix
230-system. Accounts directly on the system are available via telnet or
230-direct-dial (617-739-9753, 8N1, V.32bis (14.4K), V.32 (9600), 2400,
etc.),
230-login as new (no password) to create an account. Accounts are charged
230-at $5/mo+$2/hr or $20/20hrs/month, your choice. Grab the details in
230-the world-info directory here if interested.
230-
230-
230-Please read the file README
230-  it was last modified on Wed Apr 21 16:46:51 1993 - 310 days ago
230 Guest login ok, access restrictions apply.
ftp>
```


Steve Byan   internet: steve@hicomb.hi.com
Hitachi Computer Products (America), Inc.
1601 Trapelo Road   phone: (617) 890-0444
Waltham, MA 02154   FAX: (617) 890-4998

Date: (null)
From: (null)
Result is that the 75 ohm line is very slightly less loss.

Alternate calc:

    nmax = 10^(-Ao/10)

    n = nmax * (1 - rho^2)/(1 - rho^2*nmax^2)

where

    n = line efficiency (as a simple ratio to 1)
    nmax = matched line efficiency
    Ao = matched line loss
    rho = magnitude of reflection coefficient (.2 for this case)

For the 75 ohm line feeding 50 ohm load, this leads to

    nmax = .9207
    n = .91767
    A = .3732dB = loss in 75 ohm line feeding 50 ohm load

so the loss in the 1.5:1 SWR 75 ohm line is less than the loss in
the matched 50 ohm line.

Yet another alternate calc: see Al Bloom's posting. An
approximate expression for the current along the line is, as
Al notes, 5/6+1/6*cos(x) where x is a measure of distance
along the line. With uniform resistance of the conductors,
this leads to an average loss: find the square root of the
squared current averaged along the length of the line.
The result is sqrt(average(25/36 + 10/36*cos(x) + 1/36*(1/2+1/2*sin(2x))))
for the assumed 1 amp load current. This calcs out to sqrt(51/72)
or .8416 amps, not the .951 amps Al got (simple math error??),
which works out to .963 times the loss in the matched 50 ohm line.
This compares favorably with .944 times, as figured from the
373dB vs .396dB losses calculated above. Both methods have
some errors built in. (BTW, I really liked Al's approach to this
"quiz question": it was very general and shows that the result is
nearly independent of the diameter of the coax.)

Feedpoint impedance calcs (there are other equivalent ways to
look at this, of course):
    rhodB at input = rhodB at load + 2*Ao
    rhodB = mag of reflection coefficient, expressed in dB
   = 20 log (1/rho)
    SWR = (1+rho)/(1-rho)
which lead to SWR at input of about 1.45:1 _relative_to_75_ohms_.
This translates to 51.67 ohms or about 1.034:1 SWR. This should
be acceptable, but could be fine-tuned if needed with a simple
matching network.

Environmental considerations:

Pressure and temperature changes in dielectric constant: these
are in the vicinity of 1ppm/C and 1ppm/millibar; this is small
compared with the line length change with temperature and
therefore won't be considered further.

Dielectric constant change with humidity: didn't find any good
info on this; if it is significant, keep the gas in the line
dry...

Line length change with temperature: Linear coefficient of
expansion of copper = .0000171/C. Assume 25C nominal, -15C

minimum and +65C max. This +/-40C range should cover most
applications. It corresponds to about -2F to 149F. The line
can be put in a sheltered spot to keep it out of direct exposure
to the sun, likely a good idea anyway if it has a plastic jacket.
So the nominal 1200 inch length will change by about +/-.82
inches over the +/-40C temperature change. The wavelength at
146MHz is just over 2 meters, so .82 inches corresponds to .010
wavelengths. Using a Smith chart normalized to 75 ohms, we can
see this corresponds to 75*(.689 +/-j .04), or 51.67 +/- j3 ohms.
The SWR could reach about 1.07:1. I think most folk would be
happy with this SWR, but the reactive part could be tuned out
trivially with a small variable cap with a knob calibrated in
temperature.

73, K7ITM

Date: 25 Feb 1994 20:54:52 GMT
From: mvb.saic.com!unogate!news.service.uci.edu!usc!howland.reston.ans.net!
math.ohio-state.edu!mane.cgrg.ohio-state.edu!aus1.robins.af.mil!
wrdis02.robins.af.mil!lakeith@network.ucsd.edu
To: info-hams@ucsd.edu

References <2733@indep1.chi.il.us>, <rohvm1.mah48d-220294100035@136.141.220.39>,
<tcjCLpvwz.M5C@netcom.com>obins
Subject : Re: Probable demise of the online repeater directory project

Has anyone thought of asking the ARRL to make the data available via
the ARRL infoserver?

Larry, KQ4BY

End of Info-Hams Digest V94 #211
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